

at \$2,000.00 a year; the others all half-time, three hours a day, at \$1,200.00 a year. Eight nurses full time. One clerk. Some voluntary assistance has been given by outside physicians.

The total expense last year in maintaining this department was \$27,343.69; of which \$25,325.04 went toward salaries and supervision. \$2,018.65 went toward equipment and supplies.

Department of Physical Education.

The Department of Physical Education, which is under the supervision of Dr. Everett C. Beach, maintains 68 playgrounds in connection with the school buildings, thoroughly equipped, open three hours a day and under the supervision of trained play leaders. The average daily attendance on each of these playgrounds is 80 (5440 daily average). Daily instruction is given to the children in every room in the city, except when the negligence of the teacher interferes, in personal hygiene, gymnastics, exercises for general corrective purposes; plays and games, and exercises in motor-rhythm.

The Department maintains a director and six assistant directors. The hygienic conditions of rooms and grounds are also cared for. The cost of maintaining this department, during the past year was \$43,352.65, of which \$20,049.05 was devoted to supervision and instruction, salaries, etc. \$23,303.60 was devoted toward supplies and equipment.

In addition to these two departments the Parent Teachers' Association maintained a clinic at a total cost of \$4,031.83 of which \$3,756.90 was devoted to salaries and \$272.93 for supplies. This money was appropriated from the school fund.

CHAS. C. BROWNING,
R. G. BRODERICK,
W. F. SNOW,
N. K. FOSTER,
JNO. C. KING,
Committee.

CONCERNING UNUNITED FRACTURES.*

By JAMES T. WATKINS, M. D., San Francisco
Polyclinic.

(Continued from page 201, May issue.)

In spite of the quotation from Dr. Murphy, I am sure I saw ununited fractures 25 years ago; I think they probably occurred as frequently then as now. The human race has not in this little quarter of a century changed an appreciable amount, but the methods of taking care of fractures have changed and efforts are made to get union in cases which would have been abandoned and forgotten 25 years ago. These efforts have called into the hospitals for treatment people who formerly would have made no effort for relief. For instance, I operated a couple of years ago at the University Hospital on a man who had had an ununited fracture of the tibia and fibula for nine years. During that time he had been in that same hospital for another condition, but could not then wait long enough to have an operation done. When the opportunity occurred he returned, and an operation with the use of a Lane plate got union. Twenty-five years ago this man would have continued content with his crutches and his non-union, and so would not have been known about or counted.

Dr. L. Eloesser: This subject of delayed union

interests me very much. I can not look back upon 25 years of surgery, but it seems to me that even of late non-union has increased a good deal. I know that I used to see it rarely in Germany, but now with certain fractures I am in constant fear of non-union, although I have used no different methods on the whole to those I used abroad. I have been treating most fractures of the lower extremity with methods of traction, but have recently seen so many cases of non-union that I begin to doubt the efficiency of a method of which I was a most enthusiastic advocate. Whether it is the method alone that is at fault I do not know. It seems to me that slow union is also common in the other services at the City and County Hospital, where other means of treatment are used. Opinions as to treatment disagree so utterly that it is difficult to know what to do. We have Lucas Champonierre, who advises complete disregard of immobilization on the one hand, and on the other Codivilla, who advocates absolute fixation. The traction method allows some degree of motion, and the fragments are always moved considerably during inspections of the fracture and changes of dressing, yet in the last year or so it seems to me that I have seen cases kept perfectly immobile in plaster casts that consolidated more rapidly than those where some motion was allowed. I am at sea, and experiences of the last few years at the City and County Hospital have made me begin to lose confidence in my own powers of clinical observation.

I should like to take exception to some of Dr. Watkins's statements. He says that growth of bone takes place in the direction of least resistance. Is this compatible with Wolff's law, which has taught us that bone is laid down at the site of greatest functional demand? Furthermore, he has asserted that bone is not regenerated except from periosteum. Leaving Macewen's theories quite aside, this I think, is an axiom to which few will agree. We see evidences of endosteal ossification, of bone regeneration from the osteoblasts of the marrow in every fracture.

Dr. Sherman has said that the frequency of non-union in fractures of the lower third of the tibia and the humerus is due to atrophy of the lower fragment, the bone being cut off from nutrition because it is cut off from the blood-supply of the nutrient artery, which enters above the site of fracture. It does not seem to me that this explanation is sufficient; I think that I can show X-ray plates bearing on this point. (Demonstration.) Although I concede in answer to Dr. Sherman's objections that the bone in the lower fragment is somewhat more rarefied than in the upper one, still I do not think that non-union can be due to this alone. We see in these plates all around the upper ends of the lower fragments a shadow that evidences a plentiful periosteal production of bone—and yet this bone-production is limited to an area immediately adjoining the shaft. It does not seem to be able to bridge the gap between the fragments. If the periosteum can throw out bone around the ends of the fragments of the shaft, why can it not throw out bone between them?

* Read before the San Francisco County Medical Society, September 16, 1913.

I do not know; and this brings me to what has seemed the main point of interest in connection with non-union; the cause, the pathogenesis of this condition.

The cause in the great majority of cases is a local one. Here are plates of a man who sustained two fractures, one a Potts's; it consolidated perfectly; one of the tibia and fibula, this one has resisted all efforts to make it unite. This latter fracture occurred a year or two before his admission to the City and County Hospital. It had resisted all remedial measures, operative and non-operative. It had been wired; the position of the fragments was good. I opened the leg to put in a bone-graft, and found that the three wires which encircled the tibia were entirely hidden beneath its surface, and had been covered by a layer of bone $\frac{1}{2}$ mm. thick; a repetition you see, of the Duhamel-MacEwen ring experiment. Now in spite of the power of the tibia in the immediate vicinity of the fracture to proliferate, as evidenced by the overgrowing of the wires by bone, the bony callus was not able to bridge the gap between the fragments. I put in a graft of bone-chips and a shred of periosteum taken from another patient operated at the same time. These also refused to proliferate, and you can see the chips as small opaque shadows in the X-ray plate. They probably lie in little cavities lined with granulation tissue. It is furthermore of interest that this case shows a good periosteal callus formation around the ends of the fragments, but that the callus does not bridge the gap between them.

I have a section here of an ununited fracture of a rib. You see an aseptic necrosis of the cortical substance extending some distance backward from the site of fracture. The lacunae are empty, the bone-cells have not stained; over the end of the fragment, covering the marrow-cavity like a lid of a box is another piece of compact substance, also necrotic, with empty lacunae and unstained bone-cells. In the marrow, however, we see a plentiful production of endogenous callus, with new bone and osteoblastic and osteoid tissue in a state of active proliferation. It is the interposition of this necrotic fragment that confined the callus to the cavity of the marrow, prevented it from bridging the break, and caused non-union? I should not dare answer from this one observation alone; future experiments might shed more light on a subject which seems a fruitful one for investigation.

Dr. C. C. Crane: I am much interested in this very comprehensive paper of Dr. Watkins. I am very sorry to find that such a disparaging verdict has been rendered against the use of plaster of paris because I do not believe that it should be held responsible for these fractures which do not unite in the usual allotted time.

Although many causes for non-union have been mentioned, it seems to me that hardly too much stress can be laid upon the important part that syphilis plays in these troublesome conditions. Surely no great harm can come from the use of mercury and iodide of potash in these obscure conditions even though the Wassermann is negative. Another important item in the treatment of non-union of fractures is the Jones method of flooding and beating. The flooding is comfortable and the beating is much less brutal than it sounds. It has been my privilege to see some very happy results in the use of this method as demonstrated by Dr. Hunkin.

Dr. A. Miles Taylor: It occurs to me, as Mr. Lane has said, that when we get non-union it is

as a rule due to our own fault. In several cases I have had, in which we have used the Lane instruments and plates, and were very careful not to carry infection from the skin or outside, we have never failed to get union. It seems to me that in the cases of non-union referred to, there was either an infection present or it was carried there with the bone grafts.

Dr. J. Rosenstirn: I did not hear the paper, and can only discuss the discussion. I would simply say, in relation to the late Professor Bardenheuer's method of extension, which I saw in Cologne, that I was not so much impressed with it. It does not hold the fragments in strict apposition and that is perhaps the reason why fractures under that treatment do not unite as well as under the plaster of paris bandage. While, theoretically, it may appear that the normal conditions are perhaps better restored, the position is not permanently maintained. I prefer the method that keeps the fragments of bone in a more restful condition than the extension method of Bardenheuer, except for fractures of the carpal and metacarpal bones, where his method of finger extension is preferable.

Dr. Freytag: As to the rarefaction of the lower fragment, this is an every-day observation in X-ray work, involving not only the distal fragments of the fractured bone, but in Potts and Colles fractures also the carpus and metacarpus, tarsus and metatarsus respectively.

Dr. Barbat: At what period after fracture do you find this atrophy?

Dr. Freytag: These cases usually do not come back very soon after the fracture occurred. If there is trouble, they usually return in one or two months, and it is an exception in such cases if absorption does not take place.

(Concluded.)

AMERICAN PROCTOLOGIC SOCIETY.

This society will hold its 16th annual meeting at Atlantic City on Monday and Tuesday, June 22 and 23. The President is Dr. Jos. Mathews, of Louisville, and the Secretary is Dr. Alfred J. Zobel, of San Francisco. An excellent program has been arranged.

LASSEN-PLUMAS COUNTIES.

On the evening of March 25th with the help of Dr. Bering, the Lassen-Plumas Counties Medical Society was organized, and adopted the Constitution and By-Laws prepared by the Committee on Organization of the American Medical Association. The following officers were elected: President, Dr. W. E. Dozier of Susanville; Vice-President, Dr. Ernest E. Wilson, Greenville; Secretary-Treasurer, Dr. R. W. T. Garner, Susanville; Delegate, Dr. E. S. Drucks, Susanville; Alternate, Dr. F. J. Davis, Westwood; Board of Censors, three-year term, Dr. F. D. Walsh, Susanville; two-year term, Dr. B. B. Bolton, Edgemont; one-year term, Dr. B. J. Lasswell, Loyalton.

The society will hold meetings quarterly on the 1st Saturday in January, April, July and October. The general election of officers is to be held in October. The membership consists of nine, Drs. W. E. Dozier, Susanville; F. D. Walsh, Susanville; E. S. Drucks, Susanville; R. W. T. Garner, Susanville; B. B. Bolton, Edgemont; F. J. Davis, Westwood; E. E. Wilson, Greenville; M. B. Bolton, Quincy, and B. J. Lasswell, Loyalton.

Dr. Bering read a paper, "The Rational Treatment of Morphine Habituation," before the Society.

The Society expects to increase its membership before the year is up.

R. W. T. GARNER, Sec.-Treas.